sations of heat and cold are due not merely to the temperature of the air, but also to the direct solar radiation and the wind's velocity. Upon this basis, Mr. J. Vincent, the Belgian meteorologist, as we learn from *Engineering*, has experimented on the temperature of the exposed surface of the human body, as the hands and face, and given an account of his investigation in *Ciel et Terre* under the title "Climatological Temperature." A long series of observations has conducted him to the formula, adapted to Fahrenheit's thermometer, $\frac{99.7 - A}{S - A} = 1.42$, whence $S = 70.3 + 0.3A$, where 99.7° is the interior temperature of the human body; A, the temperature of the air; S, the temperature of the exposed skin when in shaded and calm air. Let E be the excess of solar radiation above the temperature of the air, V the velocity of the wind in miles per hour; then C, the climatological temperature, or the temperature of the skin, as influenced by A, E, and V, is

$$C = 70.3 + 0.3A + 0.2E - \sqrt{4.34V}.$$

Thus, if $A = 48°$, $E = 4°$, $V = 20$ miles, then $C = 76.3°$, and this is the temperature of the exposed skin; whereas in calm air it would have been 85 5°, and in calm and shaded air 84.7°. Here the effect of sunshine is very small. It is often very considerable. Observations carried out in this manner during December, 1889, show that the thermometrical coldest day, 20.8°, was the 3d; the warmest, 48°, the 24th; whereas the greatest sensation of cold, 71.4°, was due to the 9th; of heat, 88.8°, to the 15th. Although the air was not so cold on the 9th as on the 3d, it felt colder because there was no wind; and although the 24th was much warmer than the 15th, the 15th felt warmer because there was much less wind and powerful sunshine. The observations were made at noon. The investigation is exceedingly curious and interesting; gives a direct utility to observations of solar radiation; and, without doubt, ought to enlist the attention of meteorologists, and be carried out more extensively, for which purpose the original memoir must of course be consulted.

Probably it will be found that these relations are only tolerably identical in healthy subjects; for physiological and pathological influences, as well as those of the weather, determine the bodily sensations. This investigation, however, clearly makes manifest that our individual bodily experience is in several respects quite a different meteorological indicator to the unsentimental thermometer.

KILIMA NJARO.

THIS mountain, as is well known, consists of two summits, the Kibo and the Kimawenzi, connected by a saddle studded with hills of lava. From this saddle Dr. Meyer tried, in 1887, to scale the Kibo (*Scottish Geographical Magazine*), but had to give up the attempt on account of the weather. Last October he pitched his tent on the saddle, at an elevation of over 14,000 feet, and on the 3d of the month set forth at half-past two in the morning, accompanied by Herr Purtscheller, and provided with the usual equipment of the Alpine climber. During the darkness they made their way to the glacier valley which descends from the flanks of Kibo in a south-easterly direction, and at dawn stood on the rocky northern boundary, looking down into the valley nearly 500 feet below. Crossing this valley, the climbers reached the ridge of lava forming its southern boundary, up which they purposed to make their way to the summit of Kibo. Here they met with the first patches of snow, lying under the protection of the rocks at an elevation of 16,400 feet.

Their route now led over blocks of stone and heaps of *débris*, up the steep lava ridge,—a toilsome way,—where they had to make frequent halts to recover their breath, for the rarity of the atmosphere became more and more perceptible. Shortly before ten o'clock they came to the lower edge of the icy mantle which encircles the summit and conceals it from view. The height of this spot was about 18,270 feet. The rocky declivity over which the climbers had ascended had an inclination of 30°; the icy wall which rose above it, 35°. Dr. Meyer and his companion found it very exhausting work to scale this slope, cutting steps, as they advanced, in the ice, which, far from being firm at the bottom, became still more unsound and uneven as they ascended. At length the crevasses were crossed, the highest undulation of the ice visible below was surmounted, and at a quarter to two o'clock the climbers stood on the edge of the crater. Here they perceived that the highest point of the crater wall lay about one and a half hours' march to their left on the southern side. Weary as they were, they did not venture to run the risk of being caught in a fog, or of being obliged to bivouac on the mountain-side without any protection against the cold. They therefore turned back, and, after a day of sixteen hours, reached their camp on the saddle, congratulating themselves that at any rate the true nature of the summit had been discovered. Three days later they again went forth, and passed the night in a cave they had remarked in the right side of the glacier valley, whither Dr. Meyer's negro follower carried their blankets, etc. No fuel could be procured; but, considering the elevation, 15,150 feet, the night was mild (10.5° F.), for their bivouac was sheltered from the wind blowing over the glacier. Starting at three o'clock, the climbers reached the point where they turned back on the former occasion, at a quarter to nine. Its elevation above the sea-level was 19,220 feet. Beyond this point no great difficulties were encountered.

The edge of ice which runs round the crater slopes gradually up towards the south, where it is pierced by three peaks. It was impossible for the eye to decide which of these three was the highest, and therefore Dr. Meyer ascended all three, and found that the middle one was 50 to 65 feet higher than the others. This, the highest point in German territory, being somewhere about 19,680 feet above the sea-level, he named "Kaiser Wilhelm Spitze." From this position the crater could be well observed. Its diameter is about 6,500 feet, and it sinks to a depth of 650 feet. On the north and east the ice descends from the edge inwards in steep terraces, while on the west and south lava precipices take its place. A little to the north of the centre a slightly arched eruptive cone, composed of dark-brown ashes, rises to a height of 490 feet above the crater bottom. Its upper portion is bare, but its base is covered by a mighty glacier which escapes from the crater through a cleft in its western side.

About a fortnight later Dr. Meyer visited the northern side of the mountain, where he found the ice mantle much narrower than on the other side, beginning at an elevation of 18,820 feet, but so steep and hard that only experienced mountaineers would be able to cross it. He also descended through the great eastern cleft into the crater itself. Dr. Meyer also made several expeditions up Mawenzi, or Kimawenzi. It is evident that a much longer period has elapsed since this crater became extinct, for the whole mountain is riven, eroded, and degraded in a marvellous manner, so that it is both difficult and dangerous to climb over its rocks. Dr. Meyer considered it vain for two men to attempt the ascent of the highest pinnacle, but he reached the top of another not much lower, which he found to have a height of 17,250 feet. Towards the east the flanks of the mountains sink precipitously. The lava is so friable, and has been so much denuded by wind and rain, that the mountain is reduced to a mouldering skeleton. It is a mass of turrets, pinnacles, pyramids, and battlements, intermingled with heaps of detritus.

BOOK-REVIEWS.

Sound-English. A Language for the World. By AUGUSTIN KNOFLACH. New York, Stechert. 12°. 25 cents.

THIS is another attempt at spelling-reform. The author justly holds that the English language, by its simple structure and its extensive and rapidly increasing prevalence, is entitled to become the universal language for international communication. But the present orthography of English is an insuperable obstacle to its adoption as the world-language, and this obstacle can only be removed by a phonetic spelling. Apparently, also, he is not satisfied with the phonetic systems that others have proposed, though he offers no criticism of them. His own system has three essential points, though some of them are not peculiar to it. He

gives most of the vowel letters their Italian sound, and proposes to introduce at first five new letters, to be followed by six more at a later time. But the chief peculiarity of his system is the "strengthening" of the vowels to denote their long sound. This is done in printing by the use of full-face type, thus, "upholld," and in writing by a heavier shading of the letter. This, as it seems to us, will be an insurmountable obstacle to the adoption of the system; for who will take the trouble, in rapid writing, to shade now and then a letter more heavily than the rest? Moreover, we gravely doubt if any system can be brought into use that contains new letters; and, if new letters are to be introduced, there are other systems that have quite as good a claim to be adopted as Mr. Knoflach's.

On the Relative Advantage of Tubs with Bottoms and Tubs without. Printed for the author. New York, for sale at 20 Cooper Union. 12°.

THIS anonymous work consists of two parts, the first being in the main a polemic against the views now held by many of the Swedenborgian clergy, and the second a statement of the author's own views. He maintains that the professed followers of Swedenborg misunderstand or misinterpret the doctrines of their master, and in particular he condemns their pantheism, which he thinks Swedenborg would have regarded with aversion. In this polemic against pantheism he makes some good points He affirms also that the doctrines he criticises have no rational basis, they are tubs without bottoms; while the real doctrines of Swedenborg, as the author of this book understands them, have a basis that is all-sufficient. He then proceeds to state some of these doctrines in a simple and popular way, the leading one being a mystical interpretation of the doctrine of the Trinity. Every thing that exists, he tells us, consists of three elements, — substance, form, and force; and of these elements he says, that, though "essentially different, they yet shall have a common name, 'person,' for each *is* a person." He then goes on to maintain that in the Divine Being substance is the Father, form the Son, and force the Holy Spirit. Such, according to our author, is the true doctrine of the Trinity, and the highest principle of religion. We greatly fear, however, that this tub also has no bottom, for we can see no rational basis for such mysticism. The author expresses himself well, and with greater simplicity than most writers on such topics, and his work will doubtless have an interest for Swedenborgian readers; but to other men it is not likely to be of much use.

The Way out of Agnosticism. By FRANCIS ELLINGWOOD ABBOT. Boston, Little, Brown, & Co. 12°. $1.

THIS book consists of a series of papers based on lectures delivered at Harvard College, and originally published in the *New Ideal* newspaper. They are in the main a briefer and simpler statement of the views expressed in the author's "Scientific Theism." The introduction is a lively attack on the agnostics for maintaining a purely negative attitude, and refusing to make any attempt toward a positive theory of the universe. Mr. Abbot justly holds that mankind can not and will not remain without such a theory, and declares that the liberalism of the present day, on account of its negative character, is "infinitely inferior to the Christian mythology which it has displaced." Yet he maintains that liberalism alone can furnish the true constructive theory of the universe which is now so greatly needed, and his own aim is to present the outlines of such a theory.

As his theory has already been given to the public in his earlier and larger work, we need not devote much space to an analysis of it. His leading doctrines are these: 1. "The universal results of the special sciences, including the method common to them all, are the only possible data of philosophy or universal science." 2. "The universe is known as at once infinite machine, infinite organism, and infinite person, — as mechanical in its apparent form and action, organic in its essential constitution, and personal in its innermost being." This theory, in its identification of the deity with the universe, is pantheistic, but in affirming the personality of the deity, it is opposed to pantheism. Another of Mr. Abbot's essential doctrines is his realism, which he maintains in opposition to the phenomenalism or idealism of the prevailing modern philosophies. The book is written in a vigorous style; and, whether one agrees with its doctrines or not, it is interesting to read.

AMONG THE PUBLISHERS.

W. A. LINN'S article on "Co-operative Home-Winning," through building associations, will appear in the May *Scribner*.

— Henry Holt & Co. will publish soon "Introduction to Systematic Botany," by Charles E. Bessey, professor in the University of Nebraska, and author of Bessey's "Botanies" in the American Science Series.

— The last issue of *Garden and Forest* presents a complete list of the works treating of landscape-gardening which have been published in English, French, German, and Italian since 1625, the date of Lord Bacon's famous essay. It includes not only all books and pamphlets, but all articles and reviews on the subject, and covers nearly five closely printed pages. To make room for this list, which is a work of permanent value, the paper has been enlarged, and contains, besides an illustration of Clermont on the Hudson, with a description by Charles Eliot, its usual amount of matter in the various fields of horticulture and forestry.

—Frederick W. Whitridge, the well-known New York lawyer, who contributes an article to the April *Scribner* on "The Citizen's Rights as a Householder," tells the following story: "The series of papers upon the rights of citizens, of which this is the first, happened lately to be mentioned before a person of ripe and sound judgment, who has seen much of the world, but who is not a native of this Monte Cristo of nations; and this person, illuminated by the knowledge of many cities and men, thereupon exclaimed, 'Rights of citizens! You Americans haven't got any rights; or, if you have, you are all so afraid of each other, you dare not assert them.'"

—A curious phenomenon, in virtue of which electric cars are aided in ascending heavy grades, is alluded to by Joseph Wetzler in his article on "The Electric Railway" in the April *Scribner*. This phenomenon, which was probably first observed by Leo Daft, at his works in Greenville, N.J., in 1882, is, that, when the current passes from the car-wheel to the track, it causes an increased friction or resistance to sliding between them, the result of which is that slipping is to a large degree prevented, and heavier grades can be attempted. The explanation of this phenomenon, though not completely established, seems to lie in the direction of a slight welding action which takes place between the wheel and the rail, caused by the heat generated by the current.

— Messrs. Griggs & Co. of Chicago have published "Semitic Philosophy," by Philip C. Friese; and a singular book it is. The author professes to have the only true interpretation of Christ's doctrine of the kingdom of God, claiming that it is known "instinctively;" and he here gives a statement of the doctrine and its practical applications. He presents to us "so much of the unwritten, instinctive, rational, ideal, or natural constitution of the kingdom of God, or universal society of the races of mankind, as may, when universally assented to and adopted by tacit or express general agreement, be established as such in writing." It is drawn up in articles and sections like the Constitution of the United States, and provides for a republic of letters, a republic of the Church, a republic of industry, a republic of charity, and a republic of government, the organization and functions of each of which are duly set forth. What it all amounts to, we are unable to see. The book is a curious compound of crude social projects and hazy metaphysics, and that is all we can say for it.

—The opening article of *The Chautauquan* for April is by Professor James A. Harrison, Ph.D., LL.D., of Washington and Lee University, on "The Archæological Club in Italy;" "Life in Modern Italy," by Bella Stillman, follows; the eminent philologist, Professor Federico Garlanda, of the University of Rome,